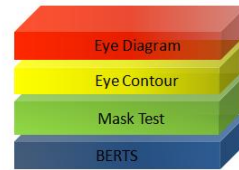


PBR-310C E-BERT User Guide

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Version 2.3 2014/03

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General Safety

Intended Audience

This document is intended for trained personnel in either telecommunications or networking environments who have a solid understanding of safety procedures around electricity and lasers.

WARNING: ONLY TRAINED AND QUALIFIED PERSONNEL ARE ALLOWED TO OPERATE THIS EQUIPMENT.

Safety on Electricity

Do not perform any action that creates a potential hazard to personnel or makes the equipment unsafe. Observe the following guidelines when working with any electrical equipment:

- Carefully examine the entire work area for possible hazards such as wet floors, ungrounded power extension cables, and missing safety grounds before beginning work
- Disconnect the power cords from the equipment whenever possible. Make sure that power cord is readily identifiable and easily reached
- Disconnect all external cables before installing or removing
- Failure to ensure adequate grounding can cause product damage and can make the product dangerous
- Never install equipment that appears damaged.
- Never position the equipment where it is difficult to operate the disconnecting device (appliance coupler).
- Use of this equipment in a manner not specified by the manufacture may impair built-in safety protection mechanisms provided by the equipment.
- The E-BERT system should be used in accordance with local and national electrical codes.
- The power plug must be connected to a properly wired earth ground outlet receptacle. An improperly wired power outlet could place hazardous voltages on accessible metal parts of the chassis.

The E-BERT PBR-310 has electrical and optical ports. Follow appropriate electrostatic discharge and optical eye safety precautions when using the PBR-310C.

ELECTRICAL CLASS I EQUIPMENT

THIS EQUIPMENT MUST BE EARTHED. Power plug must be connected to a properly wired earth ground outlet. An improperly wired socket outlet could induce hazardous voltages on accessible metal parts. Use the power cord supplied with the equipment.

ELECTRICAL - AC MAIN CIRCUIT OVERLOADING

When installing product, consideration must be given to the accumulative nameplate rating when connecting the equipment to the AC supply wiring.

ELECTRICAL – AUTOMATIC PRIMARY INPUT VOLTAGE ADJUSTMENT

This product will automatically adjust to any voltage between the ranges shown on the datasheet.

Safety Notification



WARNING

1. Always refer to this manual when working near environment which the alert mark show on the left. If operation is performed without heeding the advice in this operation manual, there is a risk of personal injury. In addition, the performance of this equipment may be reduced. Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangerous.
2. When supplying the power to this equipment, please make sure the 3-pin power cable to 3-pin grounded power outlet is well connected. If a grounded power outlet is not available, before supplying power to the equipment, use a conversion adapter and ground the green wire, or connect the frame ground on rear panel of this equipment to ground. If power is supplied without grounding the equipment, there is risk of receiving a severe or fatal electric shock.
3. This equipment cannot be repaired by user. DO NOT attempt to open the cabinet or disassemble internal parts without authorization. Only Phytrex well trained service people or staff who get the authorization could service this equipment. In addition, there is a risk of damage to precision parts inside the equipment.

CAUTIONS

1. Before changing the fuse, ALWAYS remove the power cord from the power outlet and replace the fuses. Always use new fuses of the same type and rating specified on the fuse marking on the rear panel of cabinet.
2. Keep the power supply and cooling fan free of dust.
 - Clean the power inlet regularly. If dust accumulates around the power pin, there is a risk of fire.
 - Keep the cooling fan clean and the ventilation holes are not obstructed. If the ventilation is obstructed, the cabinet may over heat.

System Specifications

The PBR-310 is intended for indoor controlled environment use only.

Environmental	
Acoustic Noise	60 dBA maximum
Temperature	Operating: 5 °C to 40 °C Storage: 0 °C to 70 °C
Relative Humidity	Operating, non-condensing 5 to 85% continuous Storage, non-condensing: 5 to 95%
Electrical	
Electrical Rating	100 to 240 VAC, 1.4A, 50/60 Hz
Mains voltage fluctuations	±10%
Transient	Transient Overvoltage Category II
Physical	
Dimensions	(L)375mm X (W)275mm X (H)85mm
Net Weight	< 8 Kgw

Handling Precautions

1. The PBR-310 is intended for operation at an ambient temperature of 25 degrees Centigrade.
2. Adequate airflow should be provided to the PBR-310 to maintain the required ambient thermal conditions.
3. Ensure that the PBR-310 power supply and all equipment used with it have properly earthed ac power supplies.
4. Standard precautions against electrostatic discharge (ESD) must be followed while handling the PBR-310. Terminate unused electrical output ports with 50 ohm connected to ground.
5. The PBR-310 must be operated in a dust-free environment. Keep unused ports capped. Particular care must be taken to ensure that the optical connectors are kept clean. It is recommended that the connector surfaces and exposed parts be cleaned periodically with lint-free wipes (Texwipes® or Kimwipe®) and talcum-free swabs soaked in optical-grade isopropyl alcohol, and then blown dry with inert dusting gas (Tech Spray® Duster 1671). Do not use freon-based cleaners.
6. Follow ESD precautions when removing or inserting pluggable optics modules. Although the modules can be removed or installed when the unit is powered up, it is recommended that the System be powered down for changing optical modules.
7. Use the USB adapter cable provided with the system to connect the serial interface to the standard USB COM port of a desktop or laptop PC.

Chapter 1 - System Overview

Introduction

The E-BERT PBR-310 is an easy-to-use bit-error-ratio tester. PBR-310 suited for research, development, and manufacturing environments. The PBR-310 is a very compact unit that incorporates electrical interfaces to a pattern generator and bit error analyzer. It comes with an intuitive graphical user interface (GUI) and a comprehensive single screen display.

The E-BERT PBR-310 has been designed to operate with few user-settable parameters and with minimal training. The System has a built-in clock recovery mechanism that is typically not available in an integrated form in commercial bit-error-rate testers. The System also has an intelligent data pattern synchronization feature that automatically initiates pattern synchronization when the data rate is changed or the Analyzer signal is interrupted.

The PBR-310 records the results of bit-error-rate measurements in a spreadsheet format for analysis and archiving. No programming knowledge is required to enable the recording feature.

PBR-310 E-BERT Features

The PBR-310 is a versatile unit possessing a wide variety of features summarized below:

- All in one BERTS and Eye Diagram Analysis
- Bit-Error-Ratio (BER) measurement for NRZ PRBS 2^7-1 , 2^9-1 , $2^{23}-1$, $2^{31}-1$
- Multi-rate operation covering from 8.5~11.3Gb/s, eyeTrex function is support from 8.5~11.1Gb/s
- Full Duplex Dual Differential 100 Ω SMA electrical interface to double the testing throughput
- Built-in clock recovery function from 8.5~11.3Gb/s with 1/64 -rate clock output
- Accumulated error count and error ratio statistics
- Graphical display of BER and Error Count
- Eye Diagram and Mask Test
- Histogram and Contour
- User programming library for sequential control
- Measurement result export option

Physical features



Figure 1:PBR-310C E-BERT

The physical features of the PBR-310C E-BERT are shown in Figure. 1.

System

The chassis provides DC power and cooling for the PBR-310. The chassis has LEDs that indicate the status of the electrical power supply and the fan.

Generator

The pattern generator produces PRBS 2^7-1 , 2^9-1 , $2^{23}-1$, $2^{31}-1$ patterns NRZ data signal that can be output to the electrical, or Optical from the front panel. The pattern generator also outputs the 1/64 data rate clock and trigger signal to facilitate observing the data signal using an sampling oscilloscope or communication analyzer. The generator has LEDs indicating the power status of the system.

Analyzer

The electrical or optical signal to be tested for bit errors is provided to the PBR-310 via the 50Ω SMA connector . Unlike most commercial bit-error-rate testers, the analyzer does not require externally clock signals .

Power Input Requirement

AC power input requirement is 100~240VAC, 50~60Hz.

⚠ CAUTION

Supplying power exceeding the above range may result in electrical shock, fire, failure, or malfunction.

Front Panel



Figure 2: Front Panel Overview

Item	Definition
1	Channel 1 Pattern Generator Differential Data Output
2	Channel 2 Pattern Generator Differential Data Output
3	Channel 1 Error Checker Differential Data Input
4	Channel 2 Error Checker Differential Data Input
5	Channel 1 Scope Differential Data Input
6	Channel 2 Scope Differential Data Input

Rear Panel



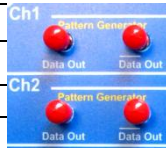
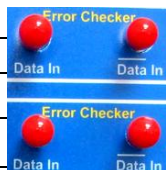
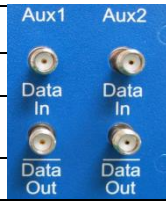
Figure 3 : Rear Panel Overview

Item	Definition
1	Reference Clock Output (1/64) to synchronize with external PBR-310C (Master)
2	Reference Clock Input (1/64) to synchronize from external PBR-310C (Slave)
3	Recovery Clock Output from Error Check Data Input
4	Re-drive Data Output from Channel 1 Error Checker
5	Re-drive Data Output from Channel 2 Error Checker

1Note.

1. Ch 2 or Ch4 is available when system installs option 01
2. Scope (eyetrex) function is available when system installs option 05, 06

Electrical Specification.

PPG Data Output (20%~80%)	Type	Differential, AC-coupled		
	Amplitude	>320m Vpp Single Ended		
	Rise/Fall Time	8.5~11.1Gb/s	< 42 ps	
	Jitter p-p	8.5~11.1Gb/s	<25 ps	
ED Data Input	Type	Differential, AC-coupled		
	Data Rate	8.5~11.3Gb/s		
	Sensitivity	<60 mVpp (Single ended)		
	Range	60~400 mVpp (Single ended)		
	Jitter Tolerance	<0.6UI		
Scope Data Input	Type	Differential, AC-coupled		
	Data Rate	8.5~11.1Gb/s		
	Sensitivity	<60mVpp (Single ended)		
	Range	60~400 mVpp (Single ended)		
	Jitter Tolerance	<0.6UI		
Re-driver Data Output (20%~80%)	Type	Differential, AC-coupled		
	Data Route	From ED Data Input		
	Rise/Fall Time	8.5~11.1Gb/s	< 42 ps	
	Jitter p-p	8.5~11.1Gb/s	<25 ps	
Recovery Clock Output	Type	Differential, AC-Couple		
	Frequency	1/64 of Data Rate		
	Jitter (rms)	<1/10 UI		
Connector		SMA		

PC interface

An USB/Virtual COM serial communication interface is provided through an USB connector jack on the front panel. Use the USB cable provided with the System to connect the unit to the desktop or laptop PC. There is no hardware flow control provided on the PBR-310's serial interface. The USB/COM port settings are shown in Chapter 2. No other special serial port settings (such as FIFO buffer sizes) are required on the computer (PC) running the E-BERT GUI.



Figure 4: USB Connector on rear panel

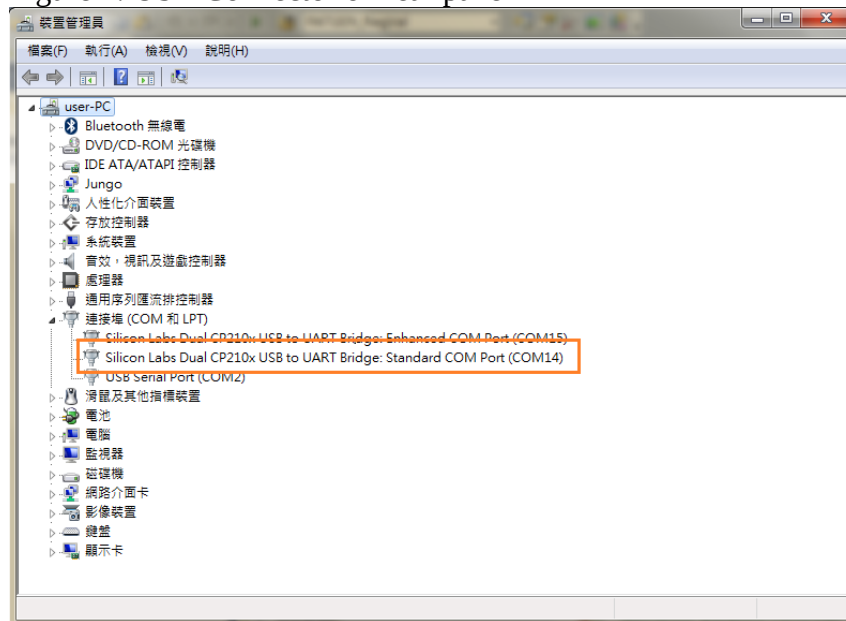


Figure 5: Virtual COM display on Device Manger in Windows® Control Panel

Chapter 2 - System Installation

Introduction

This chapter provides information necessary for the proper installation of the PBR-310.

Hardware installation

The PBR-310C package has the following items:

- ☒ Mainframe in a chassis
- ☒ DC to 18GHz Broadband Terminator
- ☒ USB Jack to Jack cable for Serial interface to PC terminal
- ☒ AC power cable (grounded)
- ☒ Software installation disk and System User Manual

The PBR-310's power supply can be connected to any AC outlet with a rating of 100-240 VAC / 50-60 Hz. It draws a maximum of 0.5A. Use of conditioned AC power is recommended.

Following item is the operation procedure

- I. Place the System on a tabletop or similar flat surface. It is recommended that the air in the vicinity of the System be relatively free of dust and heavy particulates. Excessive dust can damage fan and other internal components, and cause overheating.
- II. Connect the terminator on unused channel.
- III. Connect the USB connector of the serial interface cable to the desktop or laptop PC
- IV. to launch the E-BERT GUI (Graphical User Interface) will be run. Connect the USB connector of the cable to the E-BERT rear panel.
- V. Use the AC power cable included with the System to connect the unit to the AC power outlet. To avoid the chance of electric shock, attach the power cord to the E-BERT chassis before inserting the plug into the AC power outlet. Turn the AC power on . The front panel LEDs should glow steadily.

Software Installation

The PBR-310 GUI is a LabVIEW application operating under Microsoft Windows XP and Windows 7 operating systems¹. The E-BERT GUI needs LabVIEW 7.1 Run-Time Engine to be installed on the PC connected to the E-BERT System. The executable versions of the application and the Run-Time Engine are provided with the installation disk

Installing USB Driver

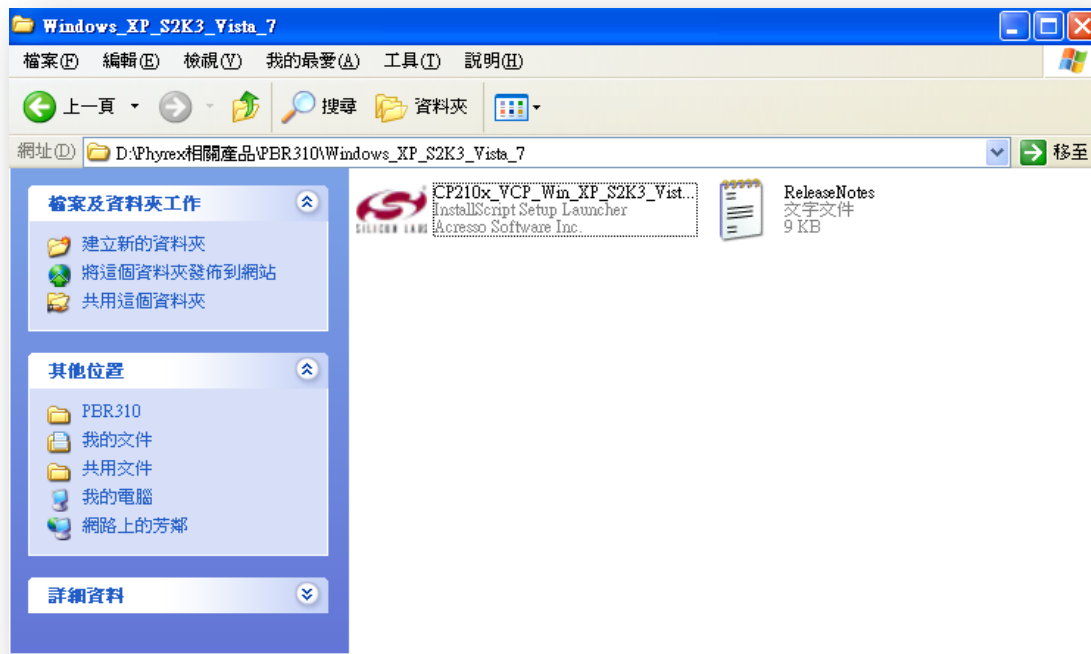


Figure 6: USB/COM Driver installation Folder

1. Power on your computer and make sure that the USB port is enabled and working properly.
2. During installation , please don't link USB-Serial cable with your computer .
3. Double click 'CP210x_VCP_Win_XP_S2K3_Vista_7.exe' , then it will start installation (Figure 3)
4. After installation , click ' OK '
5. Plug in the USB-Serial cable into the USB port
6. You can to check the Device Manager and see the Silicon Labs Dual CP210x USB to UART Bridge Standard/Enhanced COM Port,

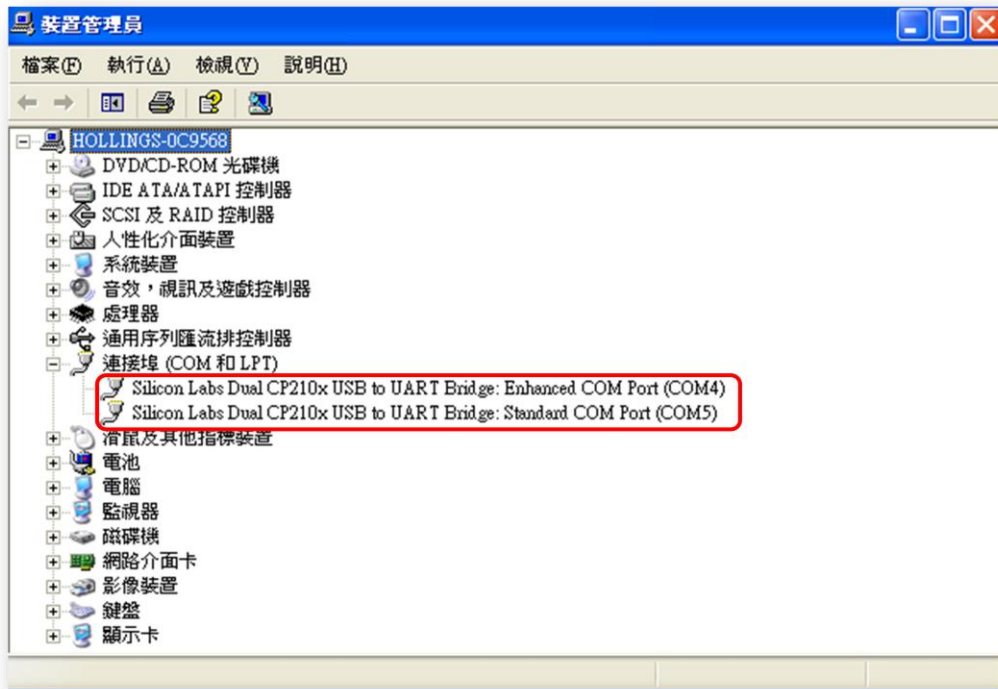
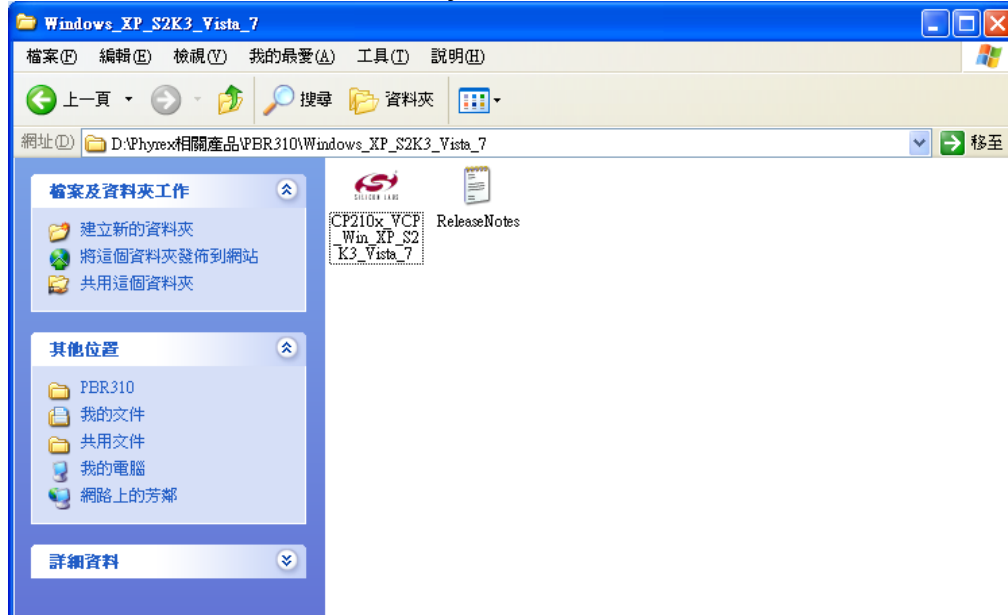


Figure 7: Check the COM port from Device manager

Installing the Run-Time Engine and the PBR-310 GUI

To install the NI Run-Time Engine and the PBR-310 GUI on the PC connected to the PBR-310, place the Software installation disk in the CD drive. Double-click the 'SETUP' file. The installer will automatically install the NI Run Time and PBR-310 GUI .



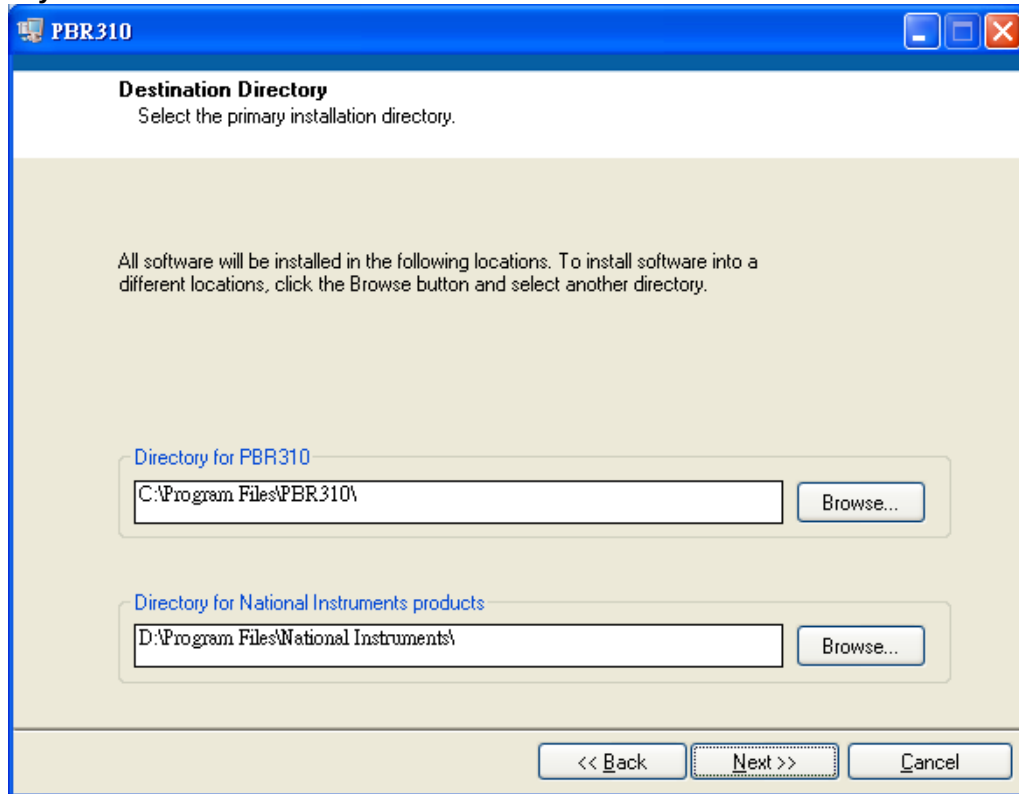


Figure 8 Installing the PBR-310 GUI and NI Run Time



Running the PBR-310 GUI

Launch the PBR-310 Graphical User Interface by double-clicking on the PBR-310 icon. Click the arrow at the top left hand corner of the screen to operate the PBR-310.

¹ Windows NT and Windows XP are trademarks of Microsoft Corp. LabVIEW is a trademark of National Instruments Corporation.

Chapter 3 - Graphical User Interface (GUI)

Introduction

The GUI presents a simple and intuitive way of operating the PBR-310C. It allows the user to easily set parameters, and displays a comprehensive set of measurement results as well as module status on a single screen.

Components of the GUI

- **Access PBR-310**, double click the PBR-310 icon  to launch the system software, the COM port setting screen will pop up to guide the user insert the COM port. Please check the windows system device manager and insert the COM port properly, Fig. 8. PBR-310 system was required dual COM ports, denote as "Standard" and "Enhanced", respectively. From Fig.6,the "Standard COM" type is designed for BERT system control, and sampling oscilloscope mode is occupied the "Enhanced COM type".

(Note : PBR-310 software ver.1.9.4 will integrate " Standard COM" and "Enhance COM" into "ID" to simplify the process)

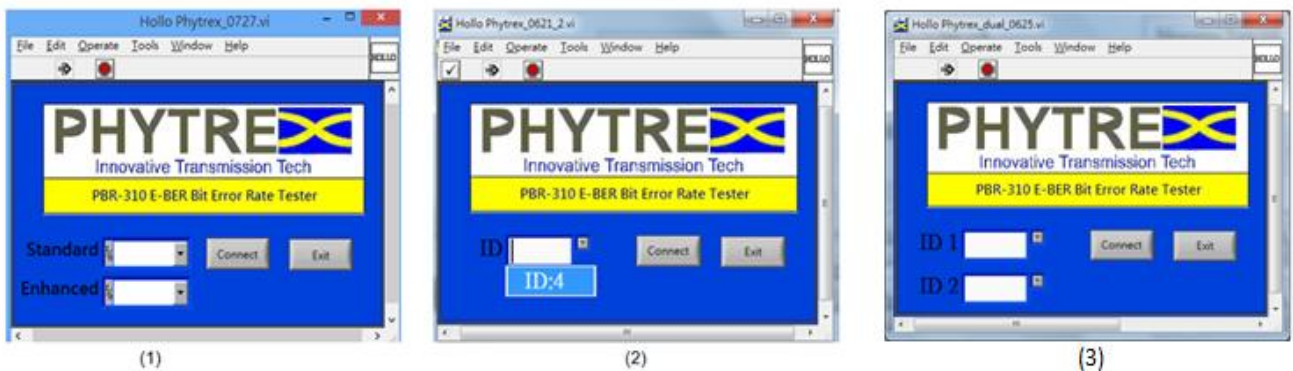


Figure 9. Insert the Standard and Enhanced COM for version 1.9.3(1) , Insert the ID number for version 1.9.4 (2) and Quad Channel Mode for version 2.3

Version	Version 1.9.3	Version 2.0~2.1	Version 1.9.4	Version 2.3
COM Port Display	Standard COM*1, Enhanced COM*1	Standard COM*2, Enhanced COM*2	ID *1	ID*2
Channels	Dual (Single Set)	Quad (Dual Sets)	Dual (Single Set)	Quad (Dual Sets)

Table 1: Software Version Comparison (Refer to Figure.9)

The main page of the GUI are illustrated in Fig.7, and it can be divided into four regions, each folder will explained as belowing.

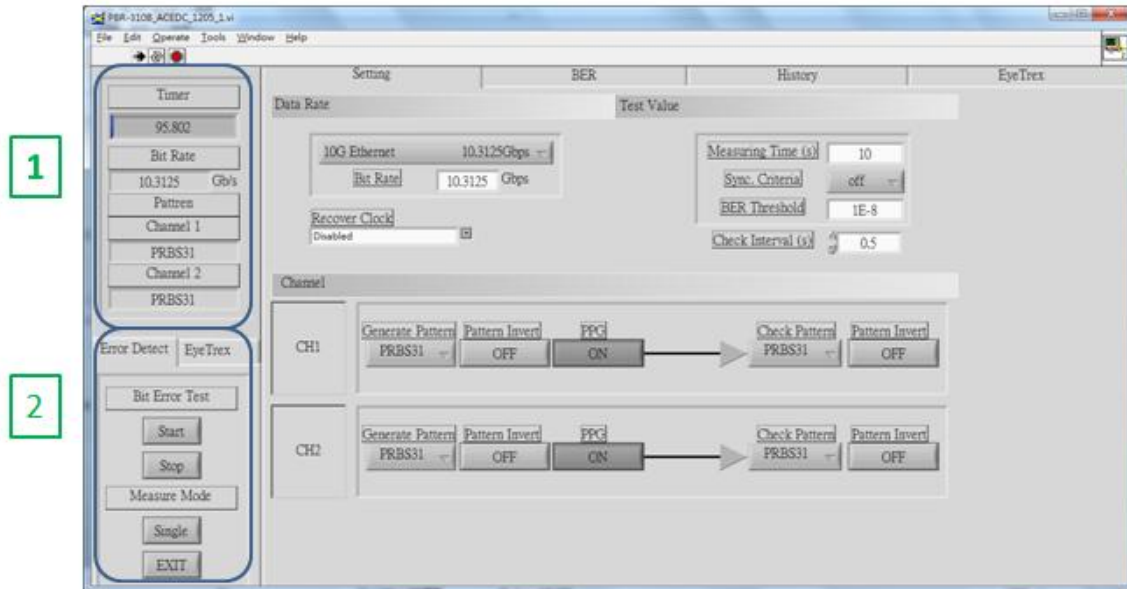


Figure 10: PBR-310 GUI

Folder	Description
Setting	Set up the all parameters of BERT system, including Bit Rate, Test Pattern, Output ON/OFF and Error detector condition
BER	Bit Error Rate Result, including Total transmitted bit number, error count, timer and status indicator
History	Show the BER history record according to the checking interval, express as histogram and table versus time line
EyeTrex™	Eye diagram test mode. Measuring the eye diagram parameters, mask test and eye contour

Item	Description
1	Setting summary table, providing user take a quick view about the setting parameters, including Bit Rate, Timer and Test Pattern
2	Testing Mode Select. BER mode and Eye Diagram mode.

Table 2, Main page unction description.

Folder -Setting

User-Interface -BERT parameters

PPG On/Off: Set the generator output enable/ disable. The default is “On”. Channel 1 and Channel 2 can be active simultaneously.

Note: **Channel output disable will also shot down the error detector.**

Pattern Invert : Set the polarity of data pattern. PBR-310C provide this function both on PPG side or ED side.

Data rate: The Data Rate menu can set the bit stream data rate. Select the desired data rate from the list.

- ☒ OC-192/192+FEC (9.953 Gb/s and 10.66 /10.71 Gb/s)
- ☒ 8G,10G Fibre Channel /+FEC(8.533 Gb/s ,10.518 Gb/s and 11.3125 Gb/s)
- ☒ 10Gigabit Ethernet/ +FEC (10.3125Gb/s and 11.097Gb/s)
- ☒ Manual , Continuous rate from 8.5G/s~11.3Gb/s

Data rates can be changed at any time during operation. Allow 1-2 seconds for a rate change to take effect. The default is 10 Gb/s.

Test Pattern: This pull-down list allows selection of one of the PRBS data patterns: PRBS ⁷2 -1, ²³2 -1, ³¹2 -1, the default is PRBS ³¹2 -1

Sync. Criteria: Sync. Success or Sync Loss state judgment is performed by Sync. Criteria value. In the sync success state, when the error ratio less than the Sync. Criteria value, if the error ratio exceed the criteria, the sync loss state is judged. In the sync loss state, pattern synchronization is not established and measurements cannot be made. However, when the error ratio is smaller than the Sync. Criteria value, pattern synchronization is established As Sync. Criteria is either of 1E-1 to 1E-10 can be selected.

BER Threshold: The pass/ fail criteria judgment is achieved through this level setting. Under the fail condition is judged if the bit error ratio is exceed the BER Threshold. BERT Threshold range can be set from 1E+0 to 1E-15

Measuring Time: This window allows the user to indicate the time over which the BER is to be accumulated. The default value is one. The measuring time can be changed at any time during operation.

Checking Interval: This window allows the user to set the checking time of error detector . The default value is 0.5s (500ms).

Exit Program: To stop and quite the PBR-310 GUI when pressing the bottom.

File: Clicking this button pops up a dialog window including the **save/load** system configuration and prompts the user to enter the name of a file under specified directory.

Phytrex SERIAL E-BERT

Use a .txt extension to make the file readable by Microsoft Notepad. **Save to database** is completion of each measuring time, error count and error ratio results are appended to database the file and it was readable through Microsoft Access. If an existing filename is used, results will be appended to the end of that file. The file has 8 columns, viz., date, time, gating time (seconds), gating time BER, gating time errors, gating time. Opening the file while the E-BERT PBR-310 GUI is recording data could stop GUI operation or corrupt data. To use the file while the GUI is running, copy the file into another name or directory. If the measuring time is set to its default value of 1, the GUI will not prompt for a file name or record data.

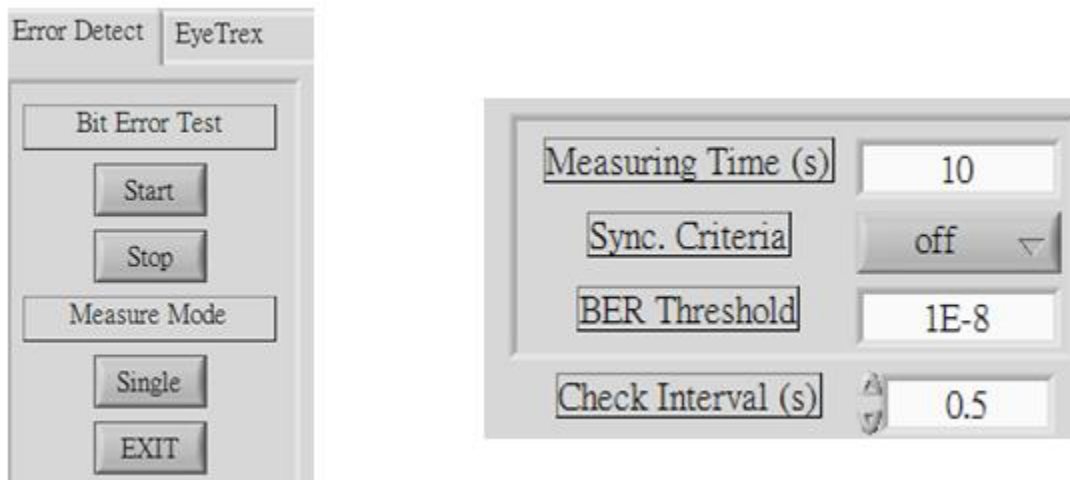


Figure 11: Bit Error Test Mode (left), Error detect setting criteria (right)
PBR-310 has an intelligent pattern synchronization algorithm and, typically, does not require the user to use this button. The PBR-310 may display a high error rate for 1 or 2 seconds when this button is clicked.

Measuring Mode: Setting testing mode into “Single” or “Repeat”

The measurement modes are defined below.

(1) REPEAT mode

Unit measurement is repeated continuously during the set gating time(measuring time).

(2) SINGLE mode

Unit measurement is performed once during the set gating time.

Start/Stop: When pressing the “Start”, it clears the previous testing result and begin the new testing event with respective gating time, error count, and BER, until pressing the “Stop”

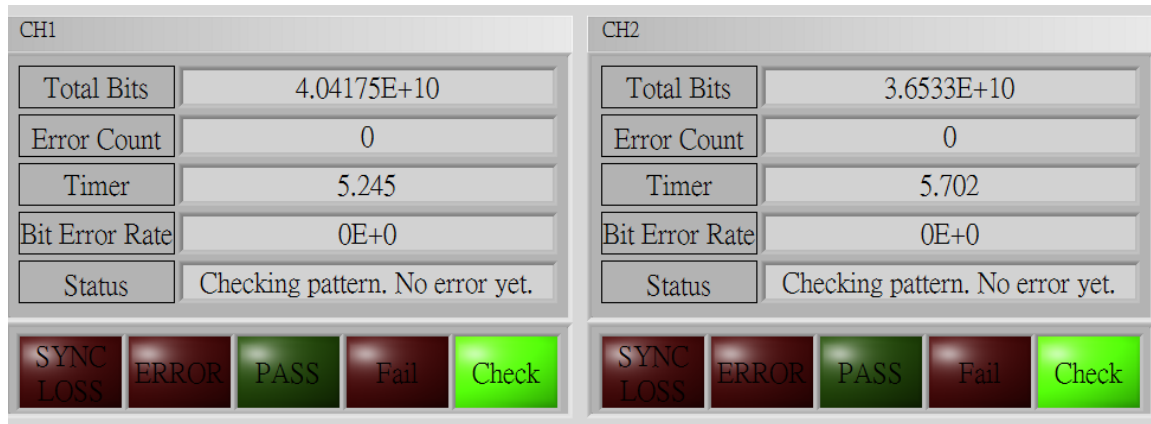


Figure 12: Bit Error information for Channel 1 and Channel 2

Time: Indicates the time that has elapsed within the current gating interval.

Error Count: Indicates the number of bit errors in the previously elapsed second. This display is refreshed every half second.

Bit Error Rate: Displays the BER (graphical) up to the last elapsed second within the current gating interval. The graphical display plots the gating time BER versus time in half second unit. The scrollbar allows viewing the BER over 24 hours. Drag and hold the scroll button along the scroll bar at the desired location. Once the scroll button is released, the graph scrolls forward automatically to display the latest BER result.

Status: Indicate the pattern checker status, there are several status for pattern checker.(Table3)

	Status	Lamp
1	Not Synchronized.	SYNC LOSS
2	Checking pattern. No error yet.	Check
3	Checking pattern. Error detected.	Error
4	Finish checking. No bit error.	Pass
5	Finish checking. Error detected.	Fail
6	Error counter full.	SYNC. LOSS, Fail, ERROR

Table 3: Pattern Checker Status and Lamp display

Lamp Indicator

SYNC. Loss: Indicates the synchronization was fail, please check the pattern type and polarity on Error Detector if it is same as Generator, or adjust the sync. criteria threshold to more looser level

Error : The lamp will light on when error occur during the measuring period

PASS : No error occur or the bit error ratio(BER) is below the threshold during the measuring period.

Fail: Error bit occur or bit error ratio(BER) is over the threshold during the measuring period.

Status : The lamp will display in different color for different status under the measuring process.

Note:

Error Ratio: (Number of Error bit under the specified measuring time) / (Number of total bits over the measuring period)

Error Count: Number of error bits under the specified measuring period.

Folder -History

This folder indicates the BER history expressed as table or histogram type. Fig. 10 shows the BER and relative information versus time, hereafter we will make the brief introduction.

CH1			
Data Time	Error Count(bit)	Bit Error Rate	Actual Time
7.252000	0	0.000000E+0	2013/3/19 下午 04
7.751000	0	0.000000E+0	2013/3/19 下午 04
8.250000	0	0.000000E+0	2013/3/19 下午 04
8.750000	0	0.000000E+0	2013/3/19 下午 04
9.247000	0	0.000000E+0	2013/3/19 下午 04
9.750000	0	0.000000E+0	2013/3/19 下午 04
CH2			
Data Time	Error Count(bit)	Bit Error Rate	Actual Time
0.000000	0	0.000000E+0	2013/3/19 下午 04
0.206000	0	0.000000E+0	2013/3/19 下午 04
0.706000	0	0.000000E+0	2013/3/19 下午 04
1.204000	0	0.000000E+0	2013/3/19 下午 04
1.706000	0	0.000000E+0	2013/3/19 下午 04
2.206000	0	0.000000E+0	2013/3/19 下午 04
2.706000	0	0.000000E+0	2013/3/19 下午 04
3.203000	0	0.000000E+0	2013/3/19 下午 04
3.609000	0	0.000000E+0	2013/3/19 下午 04
4.000000	0	0.000000E+0	2013/3/19 下午 04

Figure 13. Error/BER information

Table Item	Description
Data Time	Indicate the no. of checking interval over the measuring period
Error Count	Accumulation no. of error from start test to current state
Bit Error Rate	Accumulation BER from start test to current state
Actual Time	Indicate the corresponding date and time on your PC.

Table 4: BER Information history

■ Observe the Eye Diagram (EyeTrex)

Here are some quick tips to guide the user quickly access the EyeTrex mode to observe the Eye Diagram of DUT.

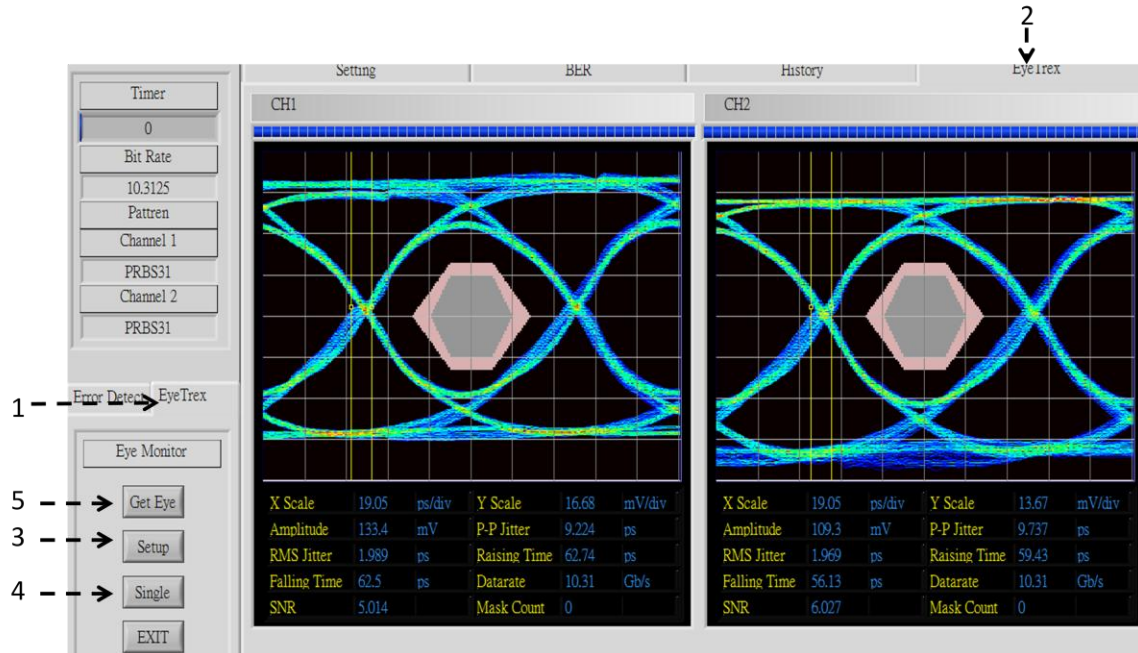


Figure 14. Operation sequence to observe the eye diagram

1. Switch to the EyeTrex Mode from left side menu
2. Switch to Eye diagram test screen
3. Setting the measuring items (eye diagram parameters)
4. Setting single/repeat mode for waveform acquisition, the measuring result will be clear and reset when it start an new acquisition
5. Start the waveform acquisition

➤ Setting Items

Here is the setting items under the EyeTrex mode

I. Eye Diagram measurement parameters

- Amplitude
- P-P Jitter
- RMS Jitter
- Rising Time (20%~80%)
- Falling Time (20%~80%)
- Data Rate
- Eye SNR

II. Eye Mask Test

Phytrex SERIAL E-BERT
Standard Mask Selection

Ethernet

- 10GbE-WAN(o) 9.953Gb/s
- 10GbE-WAN(e) 9.953Gb/s
- 10GbE-LAN (o)10.3125Gb/s
- 10GbE-LAN (e)10.3125Gb/s

SONET/SDH

- STM64/OC-192 9.953Gb/s
- FEC1066 10.664Gb/s
- FEC1071 10.709Gb/s

Infiniband/Fiber Channel

- 8GFC 8.5Gb/s
- 10GFC 10.3125Gb/s
- 10GFC+FEC 11.096

III. Mask Margin (Positive)

0~100% (0=default)

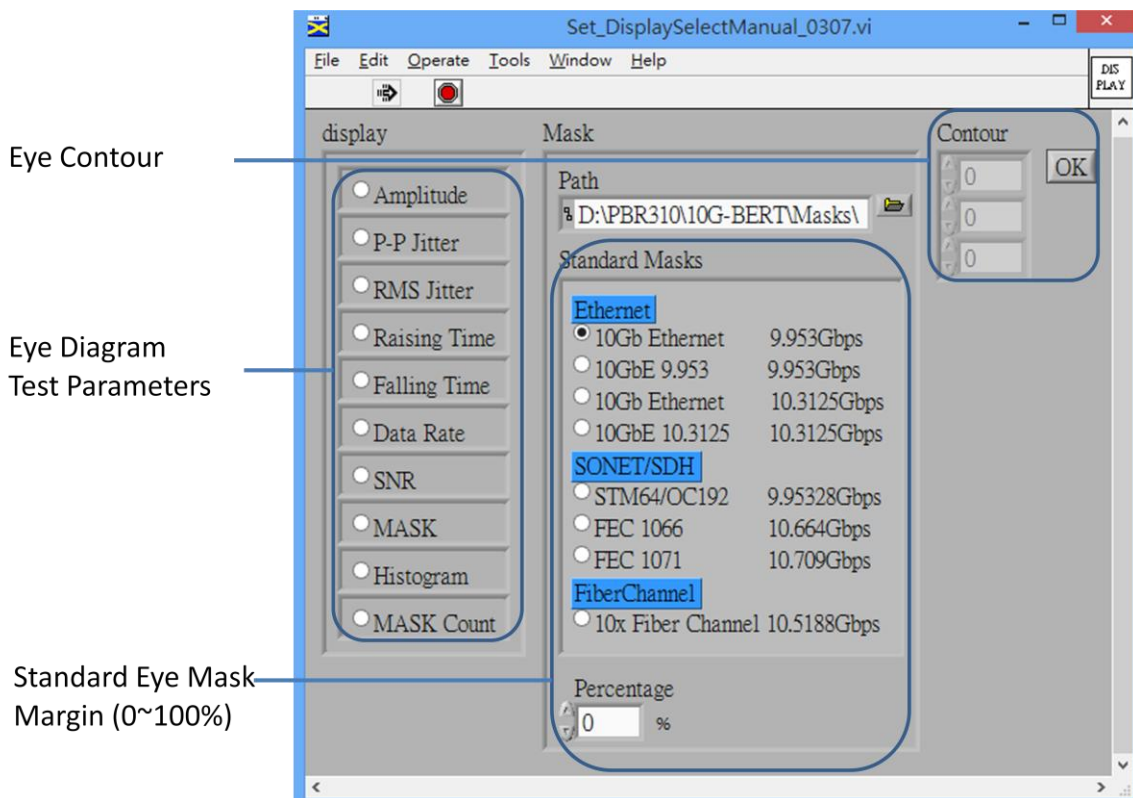
IV. Histogram (Vertical/ Horizontal Axis)

- ON/OFF

V. Contour

- ON/OFF

➤ Waveform Parameter , Mask Test and Contour Measurement Setup



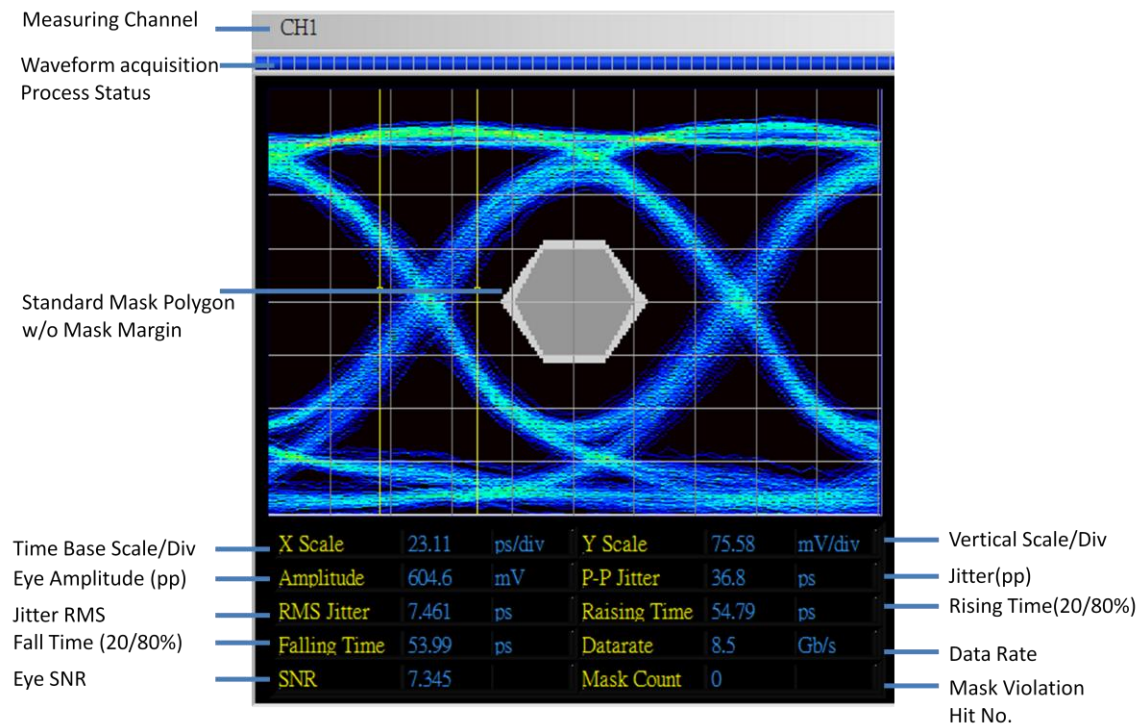


Figure 16: Eye Diagram Display and Test Result

➤ Perform the Self-Test

- Cable Connection

- (1) Channel 1 PPG $\overline{\text{Data/Data}}$ Output → Scope $\overline{\text{Data/Data}}$ Input
 - (2) Channel 2 PPG $\overline{\text{Data/Data}}$ Output → Scope $\overline{\text{Data/Data}}$ Input
- (Please add 50Ohm load with non-use port when perform with single end connection)

- GUI Operation

- (1) Setting Data Rate and Pattern Type , enable the Channel 1 / Channel 2 PPG
↓
- (2) Select EyeTrex Mode and EyeTrex Folder to perform the Eye Diagram Test
↓
- (3) Press "Setup" button , select the Eye Diagram testing parameters and enable the mask test
↓
- (4) Press "Single/Repeat" button to switch the testing mode
↓
- (5) Press "Get Eye" button to acquire the Eye diagram

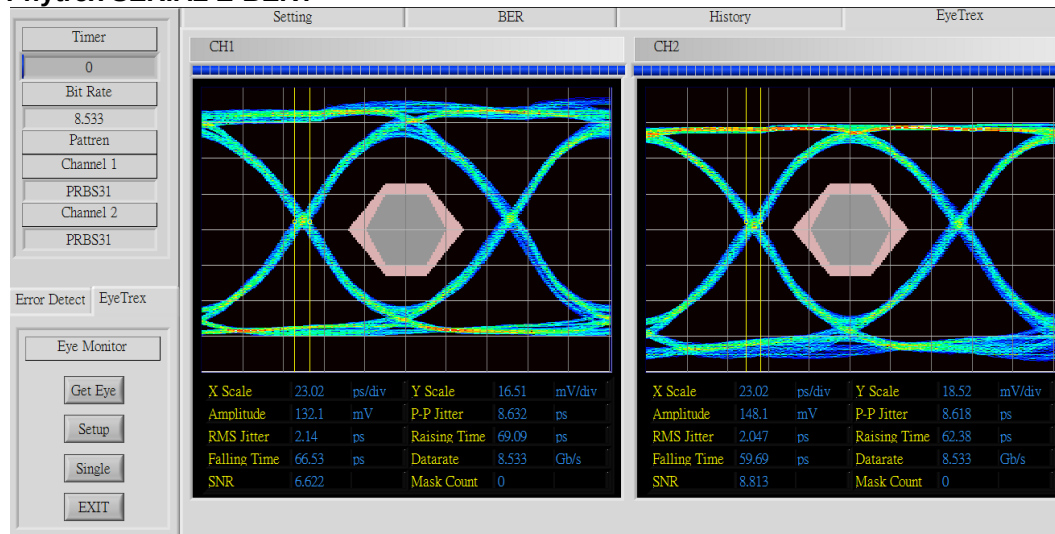


Figure 17 , 8.533Gb/s PRBS31,30%Mask Margin

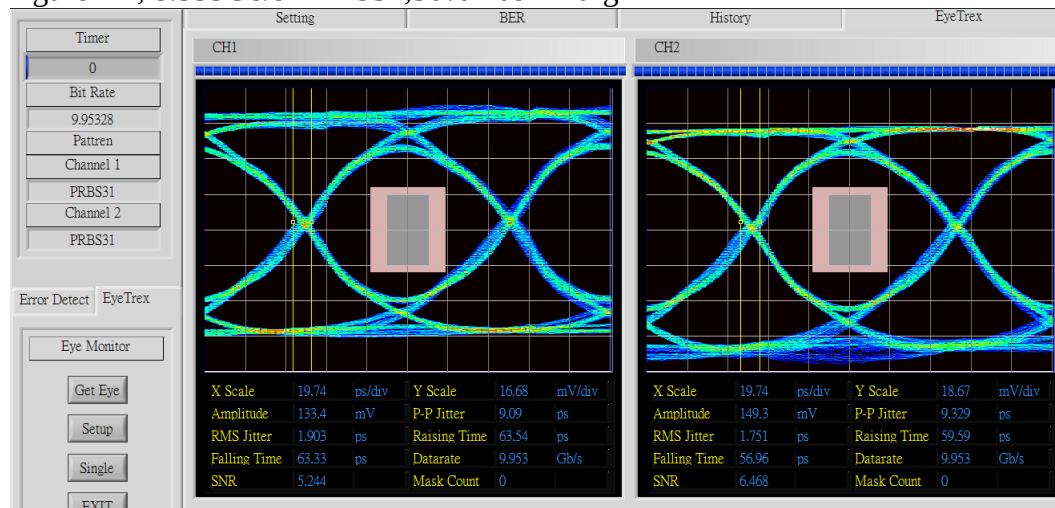


Figure 18, 9.953Gb/s PRBS31 ,30% Mask Margin

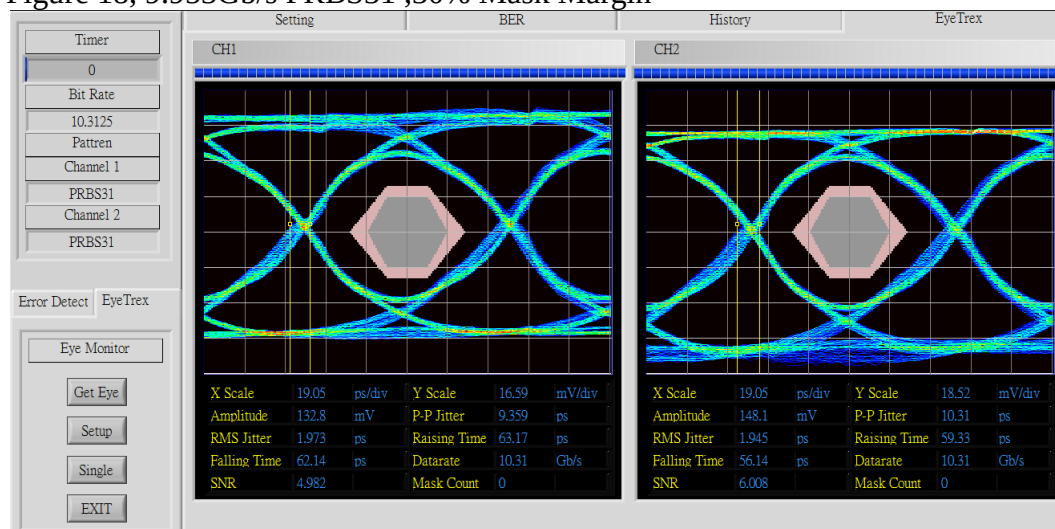


Figure 19, 10.3125Gb/s PRBS31, 30% Mask Margin

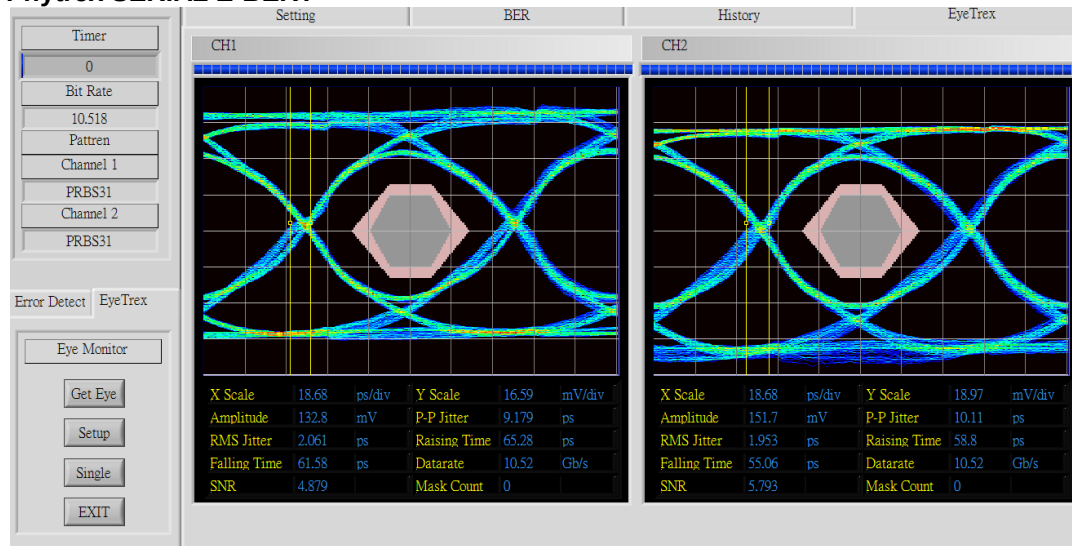


Figure 20, 10.518Gb/s PRBS31, 30% Mask Margin

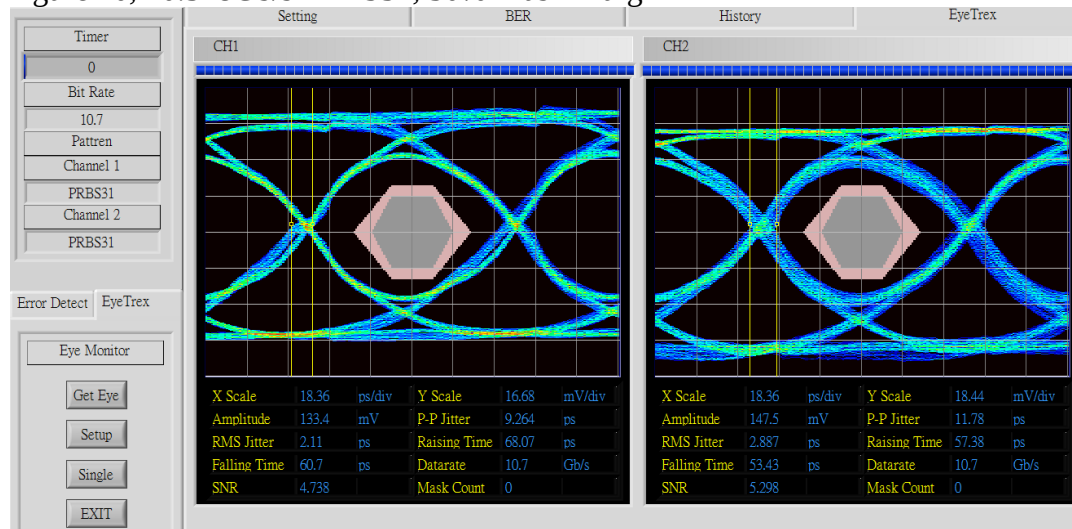


Figure 21, 10.709Gb/s PRBS31, 30% Mask Margin

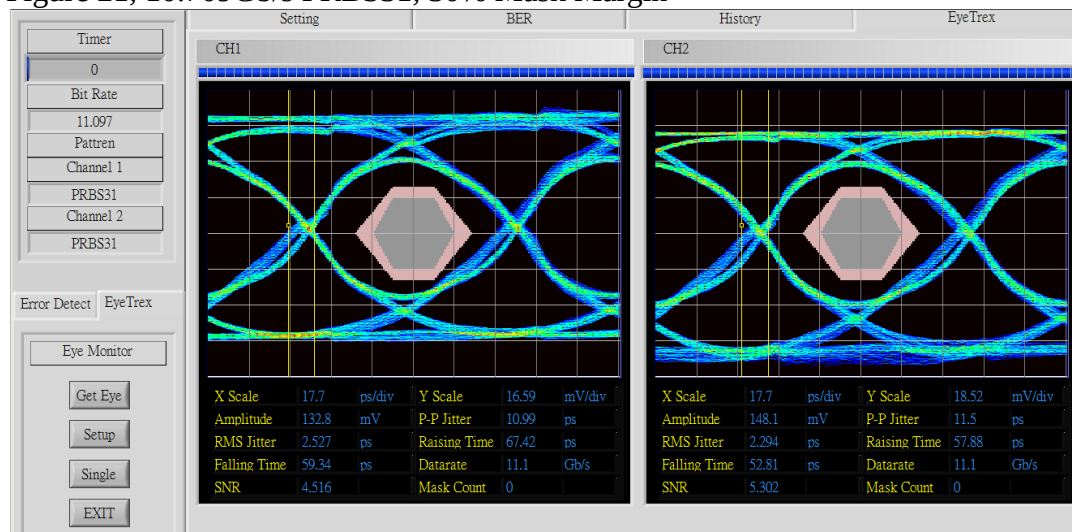


Figure 22, 11.1Gb/s PRBS31, 30% Mask Margin

➤ Eye Diagram Measuring Flow Chart

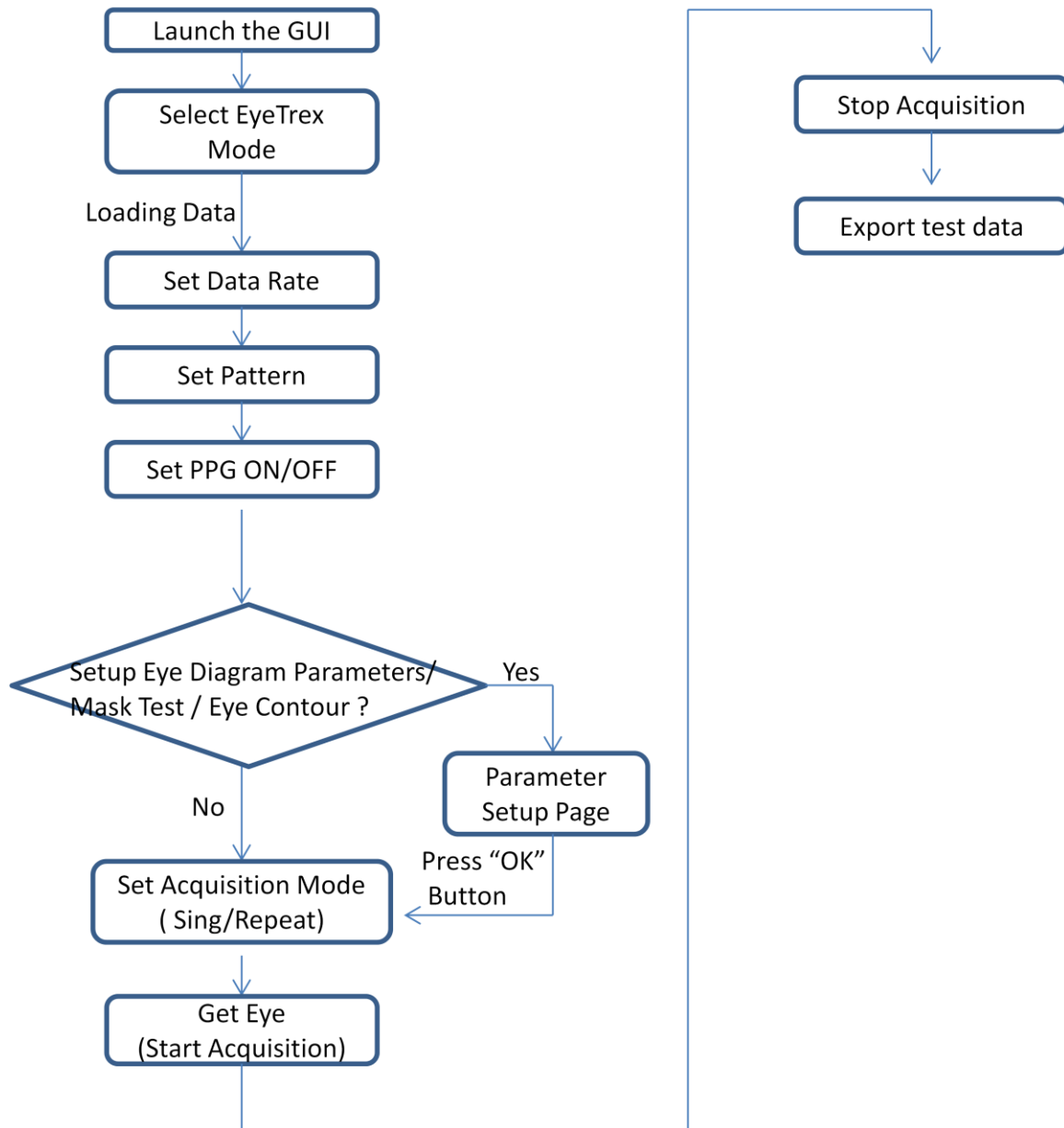


Figure 23: Basic Eye Diagram testing procedure

➤ Clock Recovery (option 08)

PBR-310 embedded the clock recovery circuit, the recovery clock can be output from the rear panel. (Figure 24. Rec. Clock)

Note: The recovery clock is 1/64 of input data rate



Figure 24, Clock Recovery Output (1/64)

Procedure :

(1) Press the Setting Folder



(2) Press The recover clock pull-down menu



(3) Select the recovery channel (Channel 1 or Channel 2)

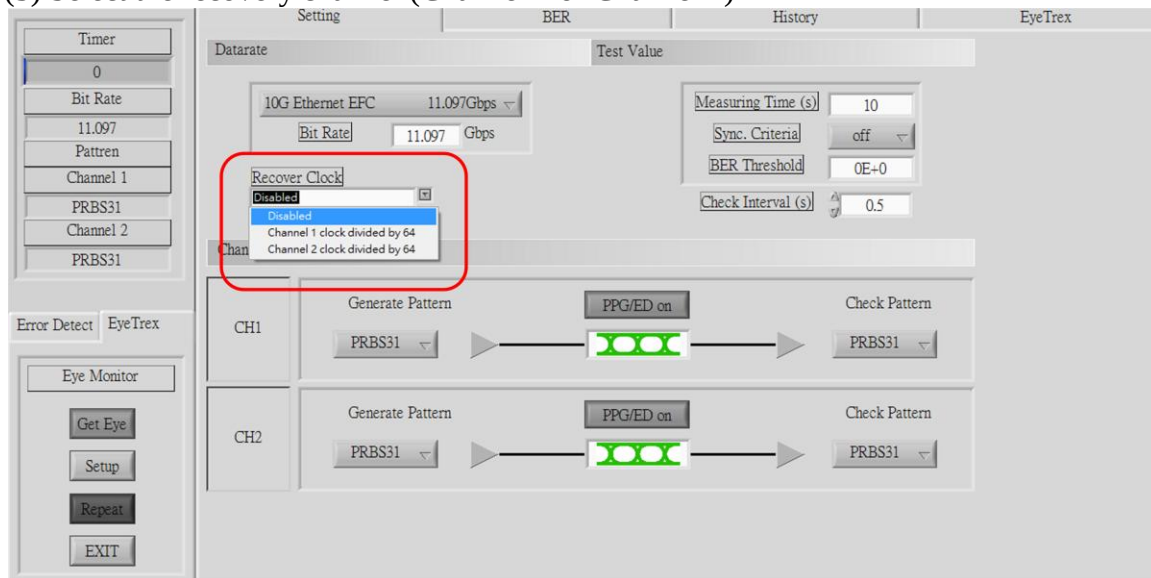


Figure 25, Clock Recovery Setup Screen

new picture

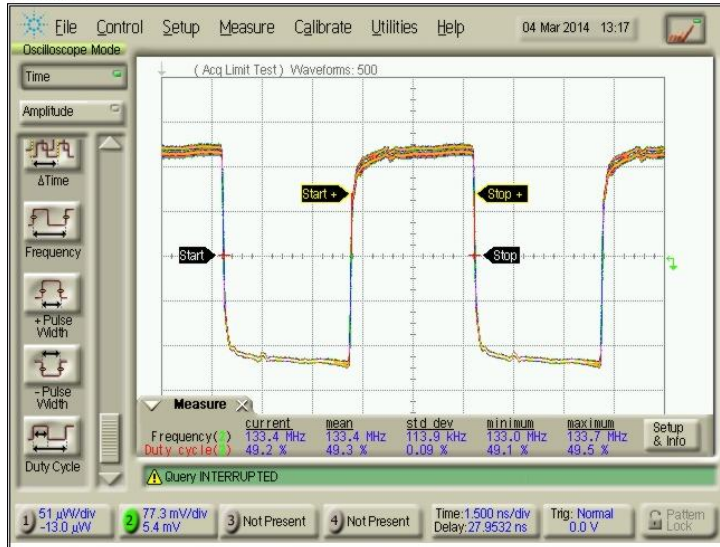


Figure 26, Recovery Clock Output Waveform @ 8.5Gb/s

new picture

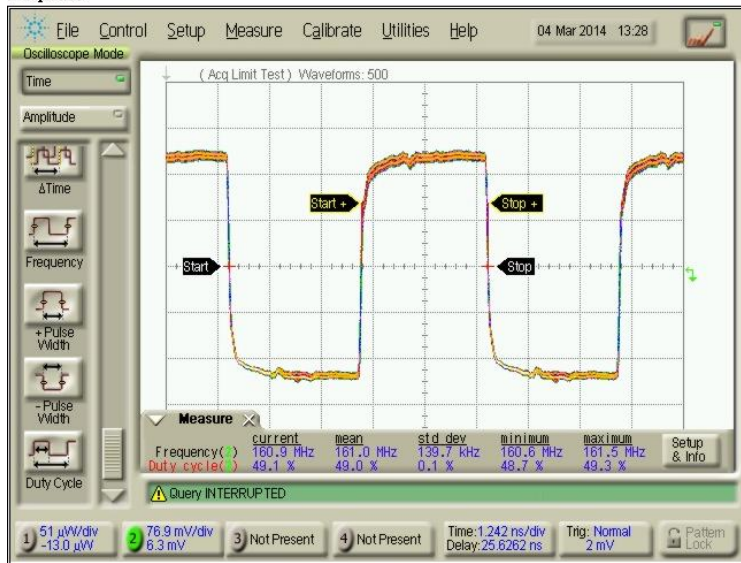


Figure 27, Recovery Clock Output Waveform @ 10.3Gb/s

- Re-drive Data Output (option 07)
PBR-310C provides re-drive data out from data input on error detector side (Figure 24). This function can support the data output range from 8.5 ~11.1Gb/s with 3 tap equalizer to pre-compensate the channel loss on the media, (e.g. PCB or Fiber cable...etc)

new picture

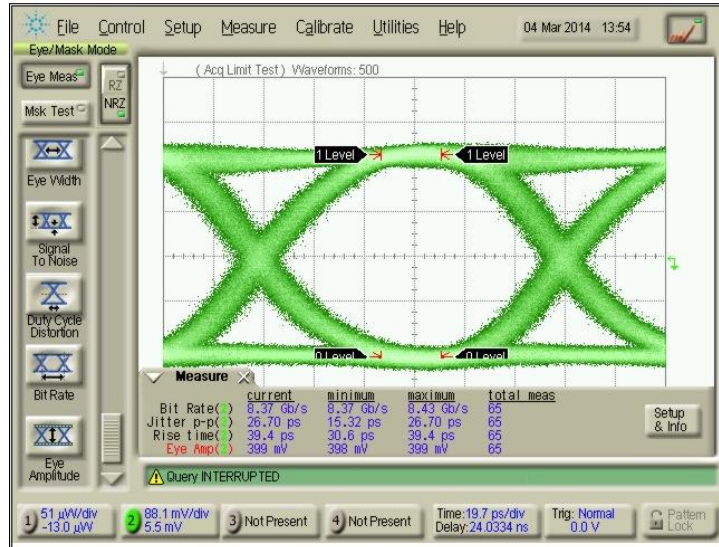


Figure 28, Re-driver data output waveform @ 8.5Gb/s

new picture

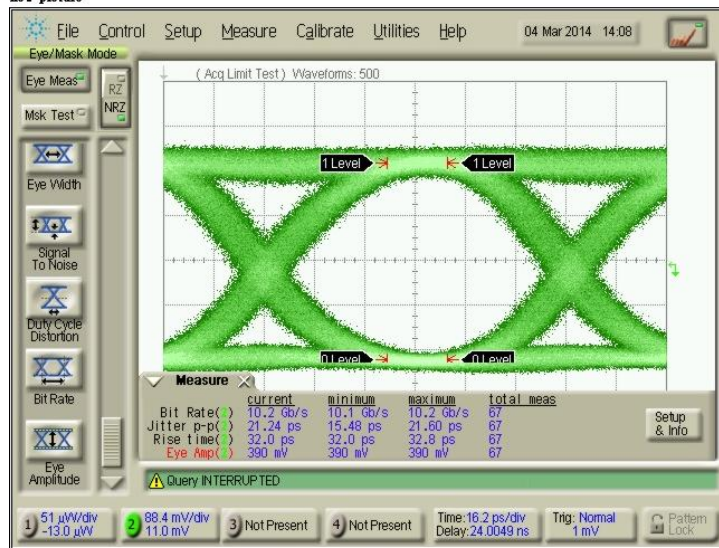


Figure 29, Re-driver data output waveform @ 10.3Gb/s

■ **Four Channel Mode :** (option 02)

PBR-310 GUI can support multiple system (2 sets) via two USB cables (Figure.29)and run the software ver.2.2. The software installation process is same as single type introduced at beginning of this chapter.



Figure 30, Four Channel PBR-310C system

Users can set the polarity of testing pattern on output or input side by clicking the "Pattern Invert" bottom

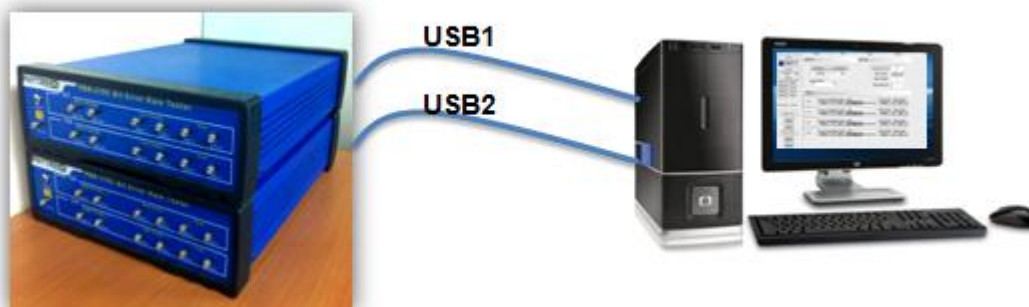


Figure 31, Multiple PBR-310C connection

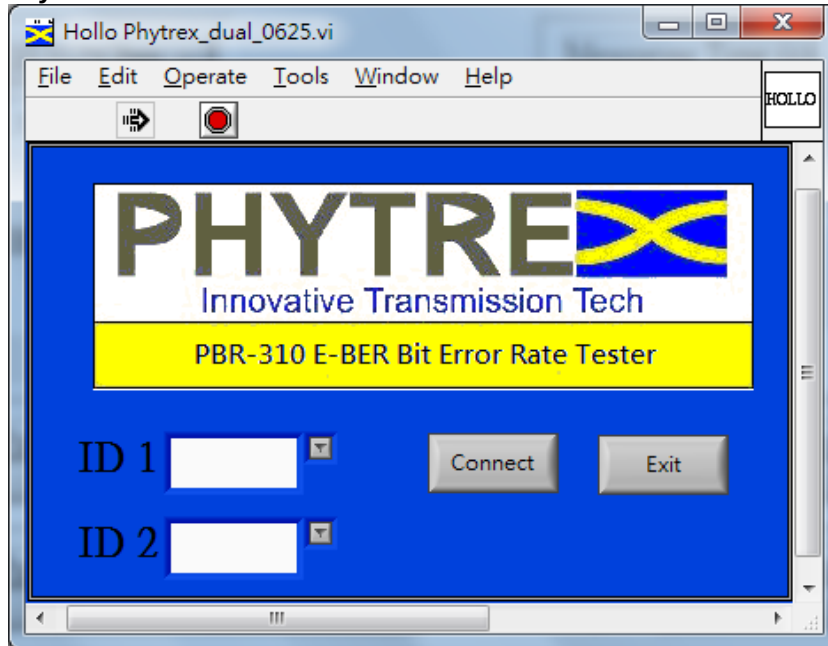


Figure 32, Four Channel Mode ID insert screen shot

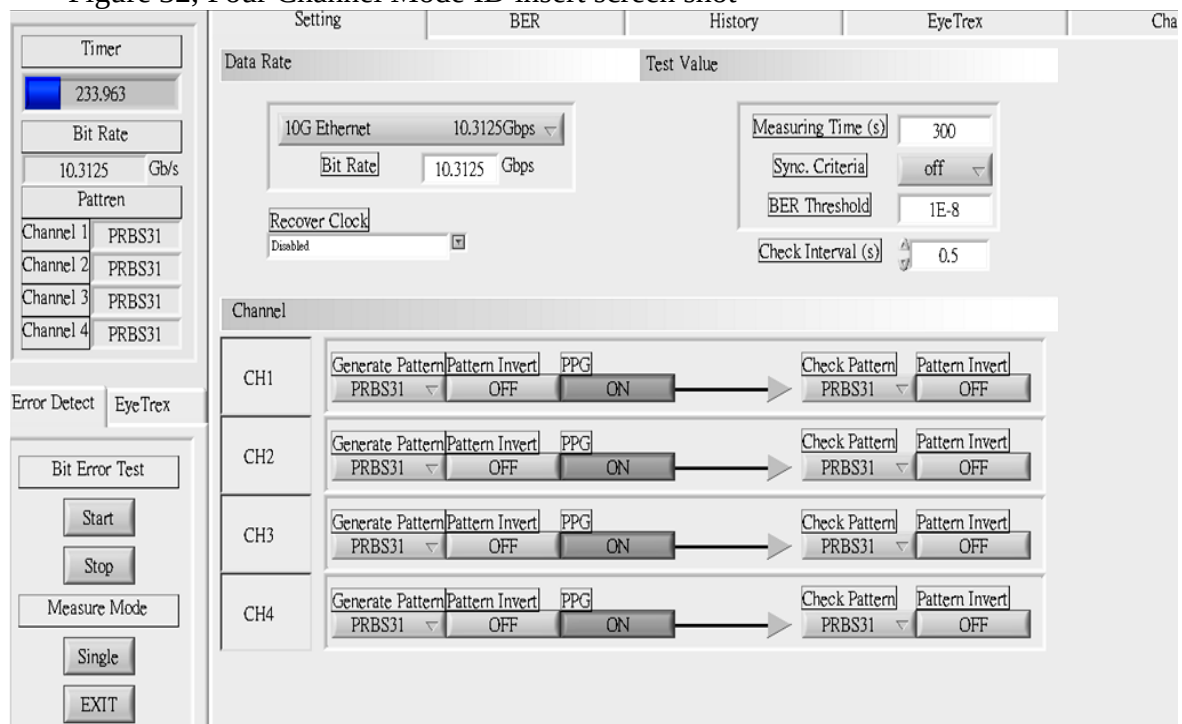


Figure 33, Four Channel Mode Operation GUI

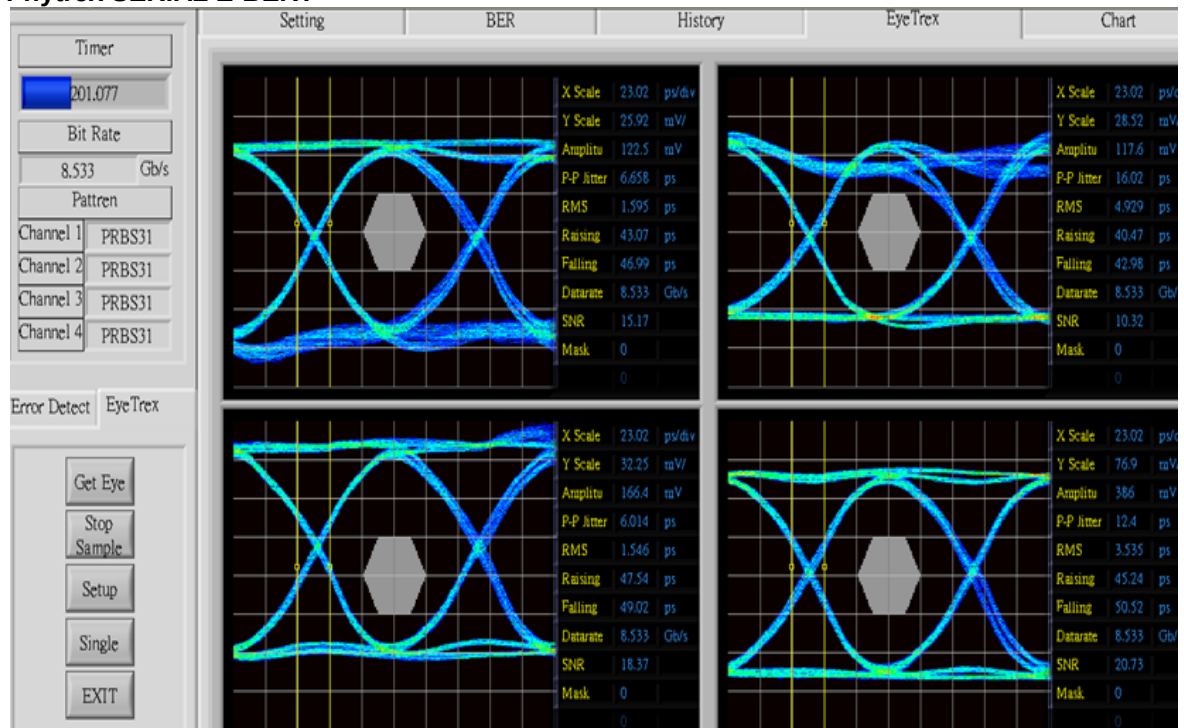


Figure 34, Four Eye Diagram Measurement and Result Display

Chapter 4 – Labview Driver Programming Guide

Introduction

This chapter describes the functionality of the PBR-310 Labview Driver. The main intention of the software is provided to support for the control of the E-BER to make the test and measurement programs.



Figure 35: Remote access and custom application development with PBR-310C VISA Driver for Labview

Installation

Installation the Labview driver must be under NI Labview 7.0 environment.

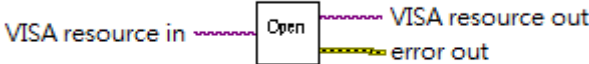
Step 1. Select E-BERT Labview Diver.exe to start installation



Step 2. Installation result in under the following folder Function panel >>All Functions>>User Libraries>>E-BER (Figure 19)

4.1. Sub VI

4.1.1 COM Port Open

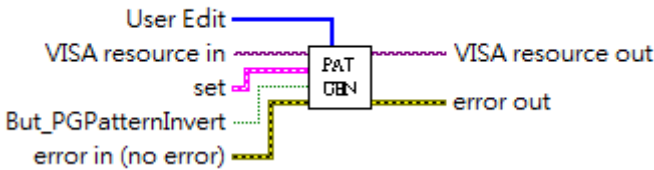
Function Name	Open
Input Variable	[VISA resource in]: COM Port connecting to PBR10
Output Result	[VISA resource out]: COM Port release for next sub vi [error out]: Check number that indicate whether the sub vi is work normal
D:\PBR310\Labview\PBR310.llb\Open_0426.vi 	
Description	Open Com Port to start operating the PBR-310

4.1.2 Loading Firmware

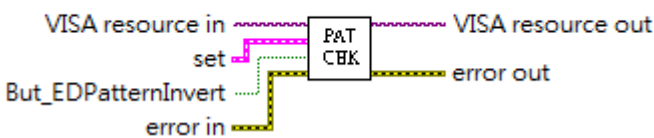
Function Name	Loading Firmware
Input Variable	[VISA resource in]: COM Port connecting to PBR310 [error in]: Check number that indicate whether the sub vi is work normal
Output Result	[VISA resource out]: COM Port release for next sub vi [error out]: Check number that indicate whether the sub vi is work normal
D:\PBR310\Labview\PBR310.llb\Set_EDC.vi 	
Description	Initialize the register variable in PBR-305 to make it ready to work

4.1.3 Set Pattern Generator

Function Name	PATGEN
Input Variable	[VISA resource in]: COM Port connecting to PBR305 [User Edit]: 64bit user edit pattern [set]:channel: ch1: channel 1, ch2: channel 2; Data rate: 8.5~11.2 Pattern: 0:PRBS7, 1:PRBS9, 2:PRBS23, 3: PBR31, 4: User Edit PG on/off: Set true to start Pattern Generation [error in]: Check number that indicate whether the sub vi is work normal
Output Result	[VISA resource out]: COM Port release for next sub vi

	[error out]: Check number that indicate whether the sub vi is work normal
D:\PBR310\Labview\PBR310.llb\PATGEN_0403.vi 	
Description	Configuration for Pattern Generation

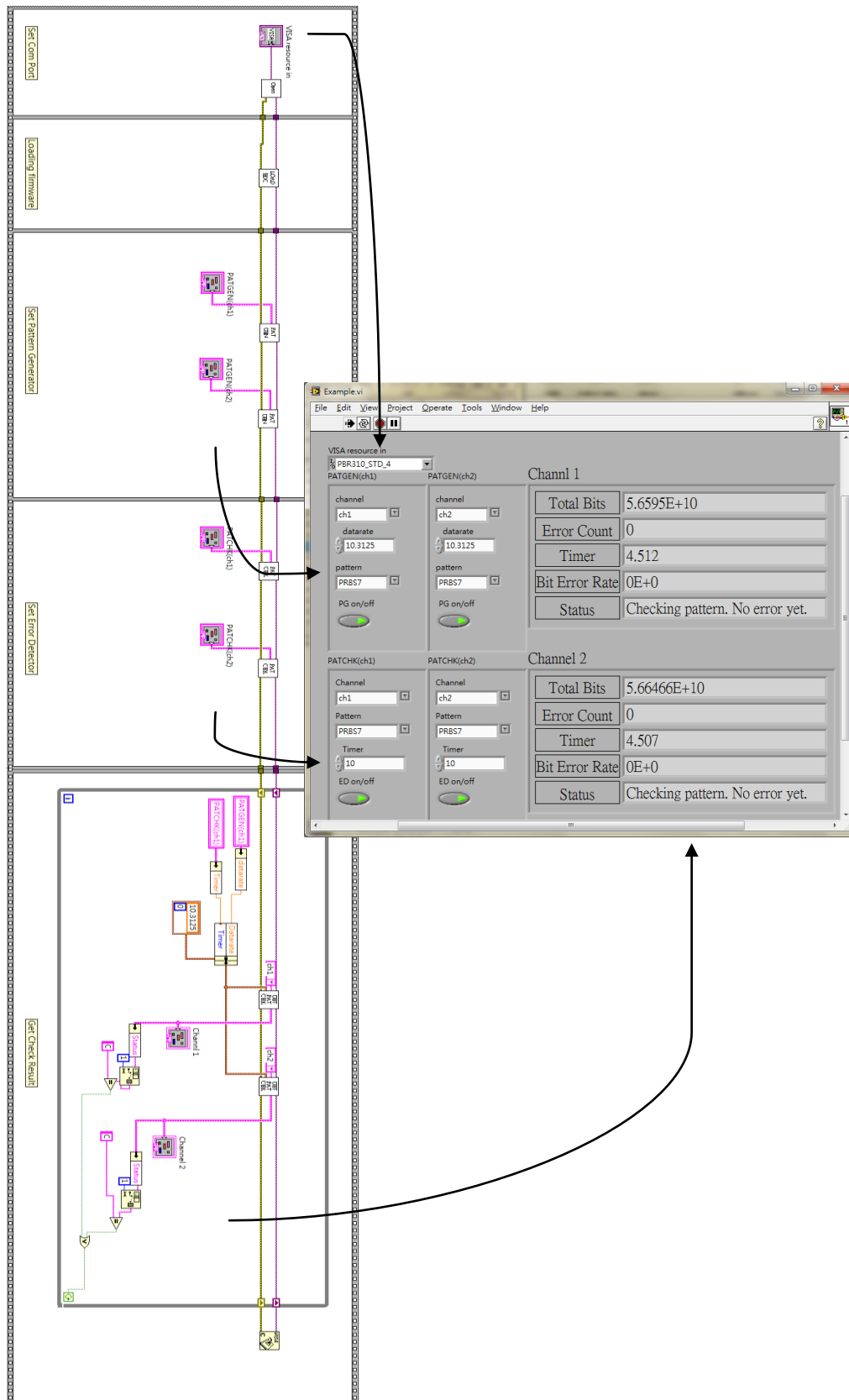
4.1.4 Set Pattern Checker

Function Name	PATCHK
Input Variable	[VISA resource in]: COM Port connecting to PBR310 [set]:ch1: channel 1, ch2: channel 2 Pattern: 0:PRBS7, 1:PRBS9, 2:PRBS23, 3: PRBS31, 4: User Edit Timer: The period of Error Detect(time unit: sec) ED on/off: set true to start Error Detect [But _EDPatternInvert]: set true to invert the electrical signal that ED receive [error in]: Check number that indicate whether the sub vi is work normal
Output Result	[VISA resource out]: COM Port release for next sub vi [error out]: Check number that indicate whether the sub vi is work normal
D:\PBR310\Labview\PBR310.llb\PATCHK_0403.vi  Set error checker Start or Stop. Set your error check Pattern (not include User Edit Pattern) Channel: string, ch1/ch2 Pattern: string, PRBS7/PRBS9/PRBS23/PRBS31 ED on/off: string, on/off	
Description	Start or Stop error detecting. Set the pattern for pattern checker

4.1.5 Get Pattern Check Result

Function Name	Get_Patchk
Input Variable	[VISA resource in]: COM Port connecting to PBR305 [channel]:ch1: channel 1, ch2: channel 2 [set]:Datarate: 8.5~11.2(Gbps) Timer: The period of Error Detect(time unit: sec)

	[error in]: Check number that indicate whether the sub vi is work normal						
Output Result	[VISA resource out]: COM Port release for next sub vi [Result]: Total Bits: Detector check bit count Error Count: error count Detector has detected Timer: the time last to finish test BER: Bit Error Rate Status: <table><tr><td>Not Synchronized.</td></tr><tr><td>Checking pattern. No error yet.</td></tr><tr><td>Checking pattern. Error detected.</td></tr><tr><td>Finish checking. No bit error.</td></tr><tr><td>Finish checking. Error detected.</td></tr><tr><td>Error counter full.</td></tr></table> [error out]: Check number that indicate whether the sub vi is work normal	Not Synchronized.	Checking pattern. No error yet.	Checking pattern. Error detected.	Finish checking. No bit error.	Finish checking. Error detected.	Error counter full.
Not Synchronized.							
Checking pattern. No error yet.							
Checking pattern. Error detected.							
Finish checking. No bit error.							
Finish checking. Error detected.							
Error counter full.							
D:\PBR310\Labview\PBR310.llb\Get_Patchk1.vi  set: Datarate Timer Result: Total Bits Error Count Timer BER Status							
Description	Get Pattern Check Result						



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FCC Part 15 Compliance

This product has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

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This product is UL and cUL Listed to the requirements of Standard UL/IEC 61010-1 Second Edition, "Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements".

FDA/IEC Laser Safety

The E-BERT is classified by the manufacturer as a Class 1 Laser product under the requirements set by FDA/CDRH 21 CFR 1040.10 and IEC 60825-2.

CE Mark

This product has been tested for compliance with the applicable Harmonized Standards under the European Commission EMC Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC including amendments to both Directives.

Modification of a certified product.

The modification of a laser product, previously certified under Sec. 1010.2, by any person engaged in the business of manufacturing, assembling, or modifying laser products shall be construed as manufacturing under the act if the modification affects any aspect of the product's performance or intended function(s) for which this section and Sec. 1040.11 have an applicable requirement. The manufacturer who performs such modification shall re-certify and re-identify the product in accordance with the provisions of Title 21 Sections 1010.2. and 1010.3.

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Wuhan

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